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MAGELLAN-ANTARCTIC: ECOSYSTEMS THAT DRIFTED APART. *W.E. ARNTZ and C. RÍOS (eds.)*

Review of marine fish zoogeography of Chilean Patagonia (42°-57°S)*

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SUMMARY: From bibliographical information on bathymetric and latitudinal distribution of 110 marine fish species of western Patagonia (42º-57ºS), the ichthyogeographic zonation of the area is discussed. The bathymetric distribution of the fish species shows a species association distributed at depths less than 100 m, a second association between 50 and 500 m, and a third association below 500 m depth. This third one is interpreted as a transitional situation of the second one, because of the scarcity of endemic species. These associations present similar latitudinal zonation patterns, including separation into a northern sector, characterized by species of lower latitudes, a southern sector with characteristic and endemic elements of that zone, and an intermediate transition sector considered as an independent association by its large extension and species composition. The Straits of Magellan represent an important faunistic exchange zone between the bottom fish communities of the Southwestern Atlantic and the Southeastern Pacific.

Key words: West Patagonia, ichthyogeography, demersal fishes.

RESUMEN: REVISIÓN DE LA ZOOGEOGRAFÍA DE LOS PECES MARINOS DE LA PATAGONIA CHILENA (42º-57ºS). – A partir de la información, principalmente bibliográfica, sobre distribución batimétrica y latitudinal de 110 especies de peces marinos de la Patagonia occidental (42º-57ºS), se presenta un esquema de zonación ictiogeográfica para el área. La distribución batimétrica de las especies muestra la existencia de una asociación de peces distribuida entre 0 y 50 m de profundidad, una segunda asociación entre 50 y 500 m de profundidad y una tercera asociación a más de 500 m de profundidad. Esta tercera asociación es interpretada como situación de transición de la segunda asociación, a causa de la escasez de especies endémicas. Estas asociaciones presentan un patrón similar de distribución latitudinal, que incluye un sector norte, caracterizado por elementos de latitudes menores, un sector sur, con elementos característicos del área y un sector intermedio de transición considerado como una unidad independiente por su extensión y composición íctica, confirmando los resultados de revisiones biogeográficas anteriores. El Estrecho de Magallanes destaca como sector de intercambio faunístico entre el Atlántico suroccidental y el Pacífico suroriental.

Palabras clave: Patagonia occidental, ictiogeografía, peces demersales.

INTRODUCTION

The ichthyofauna of the West Patagonian Region (42ºS-57ºS) is composed of a conjugation of diverse faunistic elements such as: endemic species of the sector, low latitude species, Atlantic species, Antarctic species and oceanic circumglobal species. The colonization of the Patagonian coast by recent fishes has been estimated to have started about 20,000 years ago, when gradually and with the development of the Southern channel system and especially the Straits of Magellan, an increasing mixture among the Pacific and Atlantic communities took place (Lloris and Rucabado, 1991). This process began after the last ice-age, whose maximum intensity was about 27,000-18,000 years BP, and during which the glaciers totally covered the actual Patagonian territory (Pisano, 1975).

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An important part of the currently known fishes of Patagonia was described as a result of the large expeditions to the southern hemisphere, undertaken during the past century and the beginning of the present (Jenyns, 1842; Günther, 1878, 1880, 1881; Vaillant, 1888; Boulenger, 1894, 1895; Steindachner, 1898; Lönnberg, 1905, 1907; Regan, 1913, 1914, 1916; Thompson, 1916; Norman, 1937, 1938; among others).

After this period, numerous ichthyological additions derived from the keen interest in the southern seas and in particular the Antarctic territory, shown by countries of the northern hemisphere. Important additions were made by researchers from Russia (A.P.Andriashev, A.V. Balushkin and Y. Permitin), France (J.C. Hureau), U.S.A. (M.E. Anderson, R.A. Daniels, Nafpaktitis, H.H. de Witt, R.L. Haedrich, R.R. Harry, T. Iwamoto, R.K. Johnson, R.J. Lavenberg, J.D. McEachran, B.G. and R.L. Wisner), New Zealand (McDowall), Germany (C. Karrer, K.H. Kock, G. Krefft, A. Post and M. Stehmann), Japan (T.Inada, T. Iwami, I. Nakamura), Spain (D.Lloris, J. Rucabado), and Argentine (N.B. Bellisio, A.E. Gosztonyi, A.P. Tomo), among others (see Gon and Heemstra, 1990).

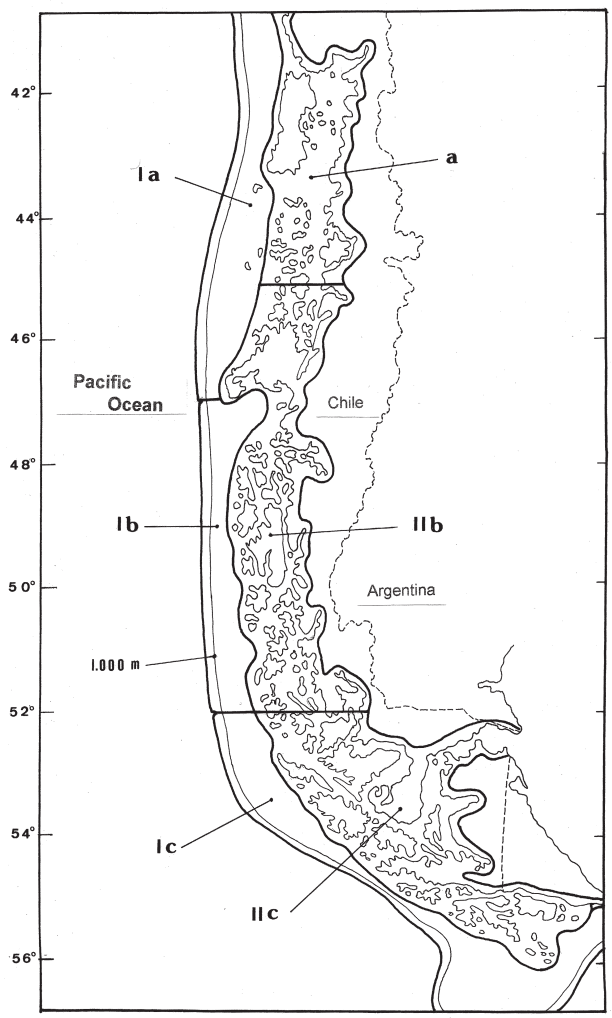

FIG. 1. – The study area and representation of the ichthyogeographic sectors found for costal and shelf fishes of Western Patagonia: I.- Approximate shelf-fish distribution; II.- Distributional area of Patagonian shallow water fishes; a.- northern sector; b.- intermediate sector; c.- southern sector.

In Chile, little ichthyological research on systematics and distribution in favour of species lists and catalogues for Patagonian waters has been done during the last decades, with the exceptions of Balbontín *et al.* (1979), Bahamonde and Pequeño (1975), Guzmán and Campodónico (1976), Lamilla (1986), Moreno and Jara (1981), Navarro and Pequeño (1979), Ojeda (1978, 1983), Pequeño (1986, 1989), Pequeño and Lamilla (1985, 1993, 1996).

Biogeographical interpretations, including the Pacific Patagonian coast, have been presented by Balech (1954) for molluscs, Ekman (1953) for marine communities in general, Andersen (1984) for notothenioid fishes, Pequeño and Lamilla (1993, 1995) for batoid fishes, and Hart (1946), López (1963), Regan (1913), Nakamura *et al.* (1986), Norman (1937) and Mann (1954) for fishes in general.

In the present revision, information on bathymetric and latitudinal distribution of marine fishes known for western Patagonia is gathered from the literature, personal collection and observations. Venegas and Sielfeld (1998) presented part of these data for the fishes of Magallanes and the Antarctic, and Sielfeld and Vargas (1992) for Chilean sharks and rays. These data are analyzed and compared with results of previous biogeographic studies of the area. In the future they may help to plan, in a more direct manner, further ichthyological research in this region.

MATERIAL AND METHODS

The study area comprises the marine environment of the south Chilean coast between 42º and 57ºS, including channels, bays, sounds, open Pacific coast and the continental shelf (Fig. 1), and was subdivided into units of one geographic degree for purpose of distribution analyses. The sectors studied are the following: sector of Chiloé Island (42º-43ºS); sector of Guaitecas Islands (43º-44ºS); sector of Puyuhuapi (44º-45ºS); sector of Port Aysén (45º-46ºS); sector of Peninsula Taitao (46º-47ºS); sector of Golfo de Penas (47º-48ºS); sector of Punta Dine-

TABLE 1. – Latitudinal and bathymetric distribution of the here considered species of marine fishes. Used terminology: Atl. = Atlantic; Int. = intertidal; * = personal not published information.

SPECIES	Depth (m)	Distribution (Lat.S)	Information sources
Halaelurus canescens (Günther, 1878)	250 - 1260	North Chile to 57º	Compagno 1984; Meléndez and Meneses, 1989.
Schroederichthys bivius (Smith, 1838)	5 - 78	Central Chile to 56º; Atl.	Compagno 1984; Meléndez and Meneses, 1989.
Schroederichtys chilensis (Guichenot, 1848)	14 - 100	Perú to 47º	Compagno 1984; Meléndez and Meneses, 1989.
Mustelus mento (Cope, 1877)	16 - 50	Ecuador to 57º; Atl.	Chirichigno, 1974; Compagno 1984.
Squalus acanthias (Linnaeus, 1758)	50 - 500	Central Chile to 57º; Atl.	Compagno, 1984.
Centroscyllium granulatum (Günther, 1887)	130 - 500	North Chile to 55º; Atl.	Zama and Cárdenas, 1984; Lloris and Rucabado, 1991.
Etmopterus granulosus (Günther, 1880)	672 - 950	Chile south of 47º; Atl.	Meléndez and Meneses, 1989.
Bathyraja albomaculata Norman, 1937	130 - 450	Chile 47º to 55º; Atl.	Norman, 1937; Lamilla 1986.
Bathyraja brachyurops (Fowler, 1910)	80 - 315	Chile 52º to 56º; Atl.	Norman, 1937.
Bathyraja macloviana (Norman, 1937)	100 - 311	Chile 52º to 56º; Atl.	Pequeño and Lamilla, 1985.
Bathyraja magellanica (Philippi, 1901)	42 - 304	Chile 42º to 47º; Atl.	Norman, 1937; Pequeño and Lamilla, 1985.
Batyraja scaphiops (Norman, 1937)	30 - 1000	Chile 55º; Atl.	Krefft, 1968; Lloris and Rucabado, 1991.
Psammobatis normani McEachran, 1983	70 - 145	Strait of Magellan; Atl.	McEachran, 1983.
Psammobatis rudis (Günther, 1870)	30 - 127	Chile 52º to 56º; Atl.	McEachran, 1983; Lloris and Rucabado, 1991.
Psammobatis scobina Philippi, 1857	40 - 45	Central Chile to 57º	de Buen, 1960 ; Pequeño and Lamilla, 1985.
Raja chilensis Guichenot, 1849	30 - 420	Central Chile to 47º; Atl.	Ojeda, 1983; Pequeño and Lamilla 1985.
Raja trachyderma Krefft and Stehmann, 1975	150 - 450	Central Chile to 47º; Atl.	Leible and Stehmann, 1987.
Callorhynchus callorhynchus (Linnaeus, 1758)	0 - 115	Peru to 56º; Atl.	Zama and Cárdenas, 1984; di Giacomo and Perier, 1991.
Galaxias maculatus (Jenyns, 1842)	0-10	III Region to the south; Atl.	McDowall, 1971 a; Arratia, 1981.
Aplochiton taeniatus Jenyns, 1812	less than 50	IX Region to the south; Atl.	Arratia, 1981.
Aplochiton marinus Eigenmann, 1928	less than 50	X Region to 50º	Arratia, 1981.
Gobiesox marmoratus Jenyns, 1842	less than 50	Peru to 51º (*)	Steindachner, 1898.
Syciases sanguineus Müller y Troschel, 1843	less than 50	Peru to 50º	Chirichigno, 1974; Sielfeld, 1979 a.
Leptonotus blainvillianus (Eydoux and Gervais,1837)	less than 10	I Region (*) and south; Atl.	Mann, 1954; Zama and Cárdenas, 1984.
Netuma barbus (Lacépede, 1803)	less than 50	Strait of Magellan; Atl.	Pozzi and Bordale, 1935; Sielfeld, 1979 b.
Merluccius hubbsi Marini, 1932	50 - 500	Strait of Magellan; Atl.	Norman, 1937; Cohen *et al*., 1990.
Merluccius polylepis Ginsburg, 1954	0 - 800	Chile 45º to 56º; Atl.	Avilés and Aguayo, 1979; Cohen *et al*., 1990.
Merluccius gayi (Guichenot, 1848)	50 - 500	Peru to 46º	Zama and Cárdenas, 1984; Cohen *et al*., 1990.
Macruronus magellanicus (Lönnberg, 1907)	30 - 500	Central Chile and south; Atl.	Avilés and Aguayo, 1979; Cohen *et al*., 1990.
Micromesistius australis Norman, 1937	50 - 900	Chile 46º to 57º; Atl.	Gon and Heemstra, 1990.
Salilota australis (Günther, 1878)	40 - 1000	Chile 47º to 57º; Atl.	Cohen *et al*., 1990.
Austrophysis marginata (Günther, 1878)	280 - 1000	Central Chile to 57º; Atl.	Fowler, 1945; Ojeda, 1983; Cohen *et al*., 1990.
Antimora rostrata (Günther, 1878)	350 - 3000	North Chile to 57º; Atl.	Cohen *et al*., 1990; Kong and Meléndez, 1991; Sielfeld and Vargas, 1996.
Halargyreus johsoni Günther, 1862	650 - 1450	Central Chile and south; Atl.	Cohen *et al*., 1990; Chiu and Markle, 1990.
Laemonema kongi Markle and Meléndez, 1988	83 - 930	Central Chile to 43º	Markle and Meléndez, 1988.
Muraenolepis microps Lönnberg, 1905	110 - 600	Chile south of 52º; Atl.	Norman, 1937; Cohen *et al*., 1990.
Muraenolepis orangiensis Vaillant, 1907	140 - 600	Chile 55º to 57º ; Atl.	Cohen *et al*., 1990; Chiu and Markle, 1990.
Cataetyx messieri (Günther, 1878)	210 - 600	Chile 48º to 57º; Atl.	Norman, 1937; Ojeda, 1983.
Genypterus chilensis (Guichenot, 1848)	50 - 150	North Chile to 57º	Avilés *et al*., 1979; Zama and Cárdenas, 1984.
Genypterus blacodes (Schneider, 1801)	50 - 500	North Chile to 57º; Atl.	Avilés *et al*., 1979; Zama and Cárdenas, 1984.
Echiodon cryomargarites Markle *et al*., 1983	357 - 440	Chile 44º to 57º	Ojeda, 1983; Zama and Cárdenas, 1984.
Letholychus patagonica Cunningham, 1871	190 - 280	Chile 52º to 56º; Atl.	Ojeda, 1983.
Crossostomus chilensis (Steindachcner, 1898)	less than 50	Chile 55º to 56º; Strait of Magellan; Atl.	Steindachner, 1898; Goztonyi, 1977; Lloris and Rucabado, 1991.
Crossotomus fasciatus (Lönnberg, 1905)	less than 50	Strait of Magellan; Atl.	Goztonyi, 1977.
Pogonolychyus marinae (Lloris, 1988)	140	Chile 55º	Lloris and Rucabado, 1991.
Pogonolychyus elegans Norman, 1937	140 - 480	Chile south of 51º ; Atl.	Norman, 1937; Goztonyi, 1977; Ojeda, 1983.
Dadyanos insignis (Steindachner, 1898)	less than 40	Strait of Magellan; Atl.	Goztonyi, 1977.
Ilucoetes fimbriatus Jenyns, 1842	less than 40	Chile 42º to 56º; Atl.	Goztonyi, 1977; Lloris and Rucabado, 1991.
Ilucoetes elongatus (Smitt, 1898)	less than 40	Strait of Magellan; Atl.	Goztonyi, 1977.
Phucocoetes latitans (Jenyns, 1842)	0 - 85	Strait of Magellan; Atl.	Goztonyi, 1977; Lloris and Rucabado, 1991.
Ophthalmolycus macrops (Günther, 1880)	73 - 256	Strait of Magellan; Atl.	Günther, 1880; Goztonyi, 1977.
Austrolychus laticinctus (Berg, 1895)	0 - 50	Chile 53º to 56º; Atl.	Goztonyi, 1977.
Austrolychus depressiceps Regan, 1913		Chile 44º to 57º; Atl.	Goztonyi, 1977; Zama and Cárdenas, 1984; Pequeño, 1986.
Coelorhynchus aconcagua Iwamoto, 1978	119 - 450	Central Chile to 49º; Atl.	Iwamoto, 1978; Cohen *et al*., 1990.
Coelorhynchus fasciatus (Günther, 1878)	73 - 823	Chile 46º to 55º; Atl.	Iwamoto, 1978.
Coryphaenoides filicaudus Günther, 1878	2470 - 5070	Central Chile to 60º	Iwamoto, 1990.
Ventrifossa nigromaculata (McCulloch, 1907)	230 - 1463	Central Chile to 54º	Pequeño, 1971; Iwamoto, 1979.
Macrurus carinatus (Günther, 1878)	110 - 300	Chile south of 47º; Atl.	Cohen *et al*., 1990.
Austromenidia smitti (Lahille, 1929)	0 -5	Chile 44º to 56º; Atl.	Zama and Cárdenas, 1984.
Austromenidia nigricans Richardson, 1848	0 - 10	Strait of Magellan; Atl.	Thompson, 1916; Lloris and Rucabado,1991.
Agonopsis chiloensis Jenyns, 1842	3 - 25	North Chile to 56º	Lahille, 1913; Navarro and Pequeño, 1979.
Normanichthys crockeri Clark, 1937	less than 50	Peru to 46º	Pozzi and Bordale, 1935; Zama and Cárdenas, 1984.
Cottunculus granulosus Karrer, 1968	350 - 500	Chile 54º to 55º; Atl.	Karrer, 1968; Ojeda, 1983.
Sebastes capensis (Gmelin, 1788)	0 - 350	Peru to 47º; Atl.	Zama and Cárdenas, 1984; Kong, 1985.
Helicolenus lengerichi Norman, 1937	130 - 500	Central Chile to 47º	Moreno and Castilla, 1976.
Congiopodus peruvianus (Cuvier and Valen., 1929)	30 - 168	Peru to 56º; Atl.	Chirichigno, 1974; Ojeda, 1983; Lloris and Rucabado, 1991.
Neophrynichthys marmoratus Gill, 1899	15 - 233	X Region to 56º; Atl.	Norman, 1937; Pequeño, 1981; Ojeda, 1983.
Careproctus falklandica (Lönnberg, 1905)	16	Strait of Magellan; Atl.	Stein *et al*., 1991.
Careproctus pallidus (Vaillant, 1888)	6 - 28	Chile 55º	Stein *et al*., 1991.

TABLE 1. (Cont.) – Latitudinal and bathymetric distribution of the here considered species of marine fishes. Used terminology: Atl. = Atlantic; Int. = intertidal; * = personal not published information.

SPECIES	Depth (m)	Distribution (Lat.S)	Information sources
Careproctus crassus de Buen, 1961	10 - 12	Chile 45º to 55º	de Buen, 1961; Moreno and Jara, 1984.
Aphos porosus (Valenciennes, 1837)	less than 200	Peru to 52º	Lönnberg, 1907; Chirichigno, 1974.
Prolatilus jugularis (Valenciennes, 1833)	5 - 60	North Chile to 49º (*)	Mann, 1954; Navarro and Pequeño, 1979; Zama and Cárdenas, 1984.
Acantholatris gayi (Kner, 1865)	6 - 180	Central Chile to 50º	Bahamonde, 1956; Arana and Ziller, 1985.
Pinguipes chilensis (Molina, 1782)	less than 50	Peru to 46º	Lorentzen, *et al*., 1979; Zama and Cárdenas, 1984.
Calliclinus gennigutatus (Valenciennes, 1836)	less than 50	Central Chile to 45º	Cervigón *et al*., 1979; Zama and Cárdenas, 1984.
Myxodes cristatus Valenciennes, 1836	less than 50	Central Chile to 46º	Stephens and Springer, 1974.
Myxodes viridis Valenciennes, 1836	less than 50	Central Chile to 46º	Navarro and Pequeño, 1979.
Hypsoblennius sordidus Bennett, 1828	less than 20	Peru to 46º	Zama and Cárdenas, 1984.
Helcogrammoides cunninghami (Smitt, 1898)	less than 20	North Chile (*) to 43º	Pequeño and Lamilla, 1995.
Ophiogobius jenynsi Hoese, 1976	less than 80	Chile 42º to 55º	Navarro and Pequeño, 1979; Pequeño *et al*., 1995
Cottoperca gobio (Günther, 1861)	5 - 160	Chile 44º to 57º; Atl.	Ojeda, 1983; Zama and Cárdenas, 1984.
Bovichthus chilensis Regan, 1913	0 - 50	Central Chile to 43º	de Buen, 1959; Navarro and Pequeño, 1979.
Paranotothenia magallanica (Forster, 1801)	0 - 255	Chile 52º to 56º; Atl.	Andersen, 1984; Pequeño, 1986; de Witt *et al*., 1990.
Patagonotothen squamiceps (Peters, 1876)	0 - 15	Chile 52º to 56º; Atl.	Thompson, 1916; Norman, 1937.
Patagonotothen elegans (Günther, 1880)	100 - 250	Strait of Magellan; Atl.	Thompson, 1916; Norman, 1937.
Patagonotohen brevicauda (Lönnberg, 1905)	5 - 8	Chile 42º to 53º; Atl.	Navarro and Pequeño, 1979; Zama and Cárdenas, 1984.
Patagonothen jordani (Thompson, 1916)	30 - 80	Strait of Magellan; Atl.	Thompson, 1916; Norman, 1937.
Patagonothen canina (Smitt,1897)		Strait of Magellan; Atl.	Norman, 1937; Moreno and Jara, 1981.
Patagonotothen thompsoni Balushkin, 1993	less than 50	Chile 51º to 53º	Balushkin, 1993.
Patagonotothen cornucola (Richardson, 1845)		Chile 43º to 56º; Atl.	Nybelin, 1969; Navarro and Pequeño, 1979; Zama and Cárdenas, 1984.
Patagonotothen sima (Richardson, 1845)	10 - 15	Chile 43º to 53º; Atl.	Thompson, 1916; Norman, 1937; Navarro and Pequeño, 1979.
Patagonotothen wiltoni (Regan, 1913)	0 - 35	Chile 43º to 54º; Atl.	Norman, 1937; Navarro and Pequeño, 1979.
Patagonotothen trigramma (Regan, 1913)	0 - 12	Chile 50º to 53º; Atl.	Regan, 1913; Moreno and Jara,1981.
Patagonotothen ramsayi (Regan, 1913)	5 - 440	Chile 52º to 53º; Atl.	Thompson, 1916; Norman, 1937.
Patagonotothen longipes (Steindachner, 1876)	0 - 100	Chile 45º to 56º; Atl.	Norman, 1937; Zama and Cárdenas, 1984.
Patagonotothen tesselata (Richardson, 1845)	0 - 25	Chile 42º to 45º; Atl.	Navarro and Pequeño, 1979; Zama and Cárdenas, 1984.
Lindbergichthys nudifrons (Lönnberg, 1905)	5 - 350	Ant.; 55º	de Witt *et al*., 1990; Stehmann and Balushkin, 1993.
Dissostichus eleginoides Smitt, 1898	70 - 1500	North Chile to 57º; Atl.	Zacharov, 1976; Ojeda, 1983; de Witt *et al*., 1990.
Eleginops maclovinus (Cuvier, 1830)	0 - 10	Central Chile to 56º; Atl.	Fowler, 1945; Zama and Cárdenas, 1984.
Champsocephalus esox (Günther, 1861)	0 - 12	Chile 52º to 57º; Atl.	Moreno and Jara, 1984; Iwami and Kock, 1990.
Harpagifer bispinnis Schneider, 1801	0 - 20	Chile 48º to 56º; Atl.	Zama and Cárdenas, 1984; Hureau, 1990.
Thysanopsetta naresi Günther, 1880	90 - 100	Chile 42º to 53º; Atl.	Thompson, 1916; de Buen, 1961.
Hippoglossina mystacium Ginsburg, 1946	109	Chile 46º to 50º	Ginsburg, 1952; de Buen, 1961.
Hippoglossina macrops Steindachner, 1876	5 - 15	Peru to 45º	Lorenzen *et al*., 1979; Zama and Cárdenas, 1984.
Paralichthys microps (Günther, 1881)	0 - 10	Peru to 45º	Chirichigno, 1974; Zama and Cárdenas, 1984.
Paralichthys patagonicus Jordan and Goss, 1889	less than 50	Strait of Magellan; Atl.	Pozzi and Bordale, 1935; Fowler, 1945.
Achiropsetta tricholepis Norman, 1930	100 - 1020	Chile south of52º; Atl.	Norman, 1930; Sielfeld, 1976; Heemstra 1990.
Mancopsetta maculata (Günther, 1880)	357 - 1200	Chile south of 50º; Atl.	Kotlyar, 1978; Ojeda, 1983; Heemstra, 1990.
Neoachiropsetta milfordi (Penrith, 1965)	164 - 840	Chile 44º to 57º; Atl.	Kotlyar, 1978; Ojeda, 1983; Heemstra, 1990.

ley (48º-49ºS); sector of Port Eden (49º-50ºS); sector of Madre de Dios Archipelago (50º-51ºS); sector of Puerto Natales (51º-52ºS); sector of Skyring Sound (52º-53ºS); sector of Punta Arenas (53º-54ºS); sector of Beagle Channel (54º-55ºS) and sector of Cape Horn (55º-56ºS).

The latitudinal and bathymetric analyses were mainly based on the bibliographical information (see Table 1). Additionally, information obtained by personal observations by the authors in the area is also included.

The analyses considered species associated with the coast and the continental shelf along the following general considerations:

1. - Pelagic species are excluded, except *Dissostichus eleginoides* Smitt, 1898, an engibenthic or midwater species, only typically pelagic during some period of its life (DeWitt *et al*., 1990), *Antimora rostrata* (Günther, 1878) that is benthopelagic (Cohen *et al*., 1990), *Galaxias maculatus* (Jenyns, 1842) and *Aplochiton taeniatus* Jenyns, 1812, which were captured by the authors in estuarine and subtidal situations inside channels and sounds, *Normanichthys crockeri* Clark, 1937, a pelagic but clearly coastal species (Vegas and Pequeño, 1993), as well as *Austromenidia nigricans* Richardson, 1848 and *A. smitti* (Lahille, 1929). 2. - The bathymetric and latitudinal distribution range is only referred to subadult and adult specimens, as indicated by the respective authors of Table 1; information for larvae was not considered. 3. - In the case of two or more records continuous distribution is supposed. 4. - In the case of a single record for the area, only punctual distribution was considered.

The list of species in Table 1 does not include *Pseudomancopsetta andriashevi* Evseenko, 1984, only known very far off the south Chilean coast (Heemstra, 1990). *Aplochiton marinus* Eigenmann,1928 is maintained as a valid species following Zama and Cárdenas (1984), although its conspecificity with *A. taeniatus* Jenyns, 1842 is suspected(see Mc Dowall, 1971b). *Lycodapus australis* Norman, 1937 is excluded from the analysis because of its uncertain status. *Bathyraja griseocauda* (Norman, 1937), *Raja doellojuradoi* Pozzi, 1935 and *Raja frerichsi* Krefft, 1968 are excluded from the analysis, despite their presence off the Pacific and Atlantic coasts (Pequeño and Lamilla, 1993), because their occurrence has not yet been documented for the South Chilean Patagonian coast. *Patagonotothen ramsayi* (Regan, 1913) and *P. wiltoni* (Regan, 1913) are maintained as valid species according to Stehmann and Balushkin (1993). *Harpagifer palliolatus* Richardson, 1845, cited by Lloris and Rucabado (1991) for the Beagle Channel, is maintained as subspecies of *H. bispinnis* Schneider, 1801, as indicated by Nybelin (1947, 1969) and Lloris *et al*. (1996). The species of *Agnatha* were excluded, because the existent information was considered insufficient by authors, to support the present distributional analysis. *Scymnodon macracanthus* Regan, 1906 is only known by its holotype from the Straits of Magellan (Compagno, 1984). It was excluded from the analyses. *Paralabrax humeralis* (Valenciennes, 1828), reported for Smyth Channel, Punta Arenas, by Lönnberg (1907), needs to be confirmed for the region, because of the thermophilous character of the fishes of this family. *Notorhynchus cepedianus* (Peron, 1907) was reported by Guzmán and Campodónico (1976) for the eastern entrance of the Straits of Magellan. As this genus is wideranging in temperate seas, distributed from Peru to central Chile in the South Eastern Pacific (Compagno, 1984), the Magellan specimens are here considered as belonging to the Atlantic population.

In the analysis of the latitudinal distribution, the eastern sector of the Straits of Magellan (east of 71ºW) was excluded, this area being treated separately. The cluster analyses were expressed in form of dendrograms using Jaccard's qualitative index of similarity (Sj). The applied aggregative algorithm was the UPGMA method which uses arithmetic means (Menni and Gosztonyi, 1982; Sielfeld *et al*., 1995; Sielfeld and Vargas, 1996), with the following equation:

$$S_j = \frac{a}{a + b + c}$$

where:
a = number of species endemic to group A
b = number of species endemic to group B
c = number of species that are in group A and B

RESULTS

Bathymetric analysis

The bathymetric analysis for 95 species of marine fishes of the extreme south of Chile (42º-57ºS) showed the existence of three fish associations (over 30% of similarity) (Figure 2). One of them groups fishes distributed between 0 and 50 m depth, clearly separated from the remaining associations (similarity less than 10%). 59 species integrate this group, 36 of them (61%) endemic (Table 2) and belonging to families like Triakidae, Galaxidae, Aplochitonidae, Gobiesocidae, Syngnathidae, Atherinidae, Agonidae, Normanichthyidae, Pingui-

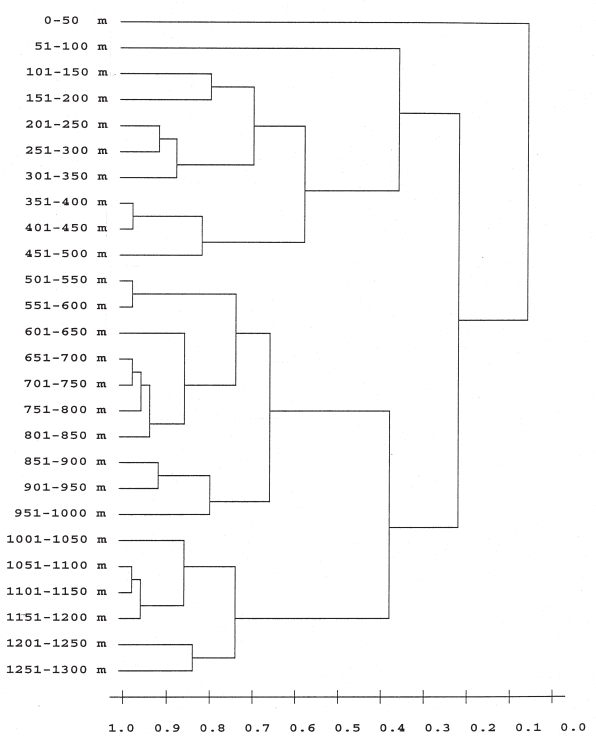

FIG. 2. – Taxocenotic similarity (Jaccard index) between bathymetric strata of the western Patagonian ichthyofauna, showing three major fish associations: 1.- 0 to 50 m, 2.- below 50 m to 500 m, 3.- below 500 m.

TABLE 2. – Distribution of species by sectors and bathymetric levels. Used terminology: N northern sector; I: intermediate sector; S: southern sector.

Bathymetric level		0 - 50 m			50 - 500 m			below 500m		
FAMILY	SPECIES	N	I	S	N	I	S	N	I	S
SCYLIORHINIDAE	*Halaelurus canescens* (Günther, 1878)				•	•	•	•	•	•
SCYLIORHINIDAE	*Schroederichthys bivius* (Smith, 1838)	•	•	•	•	•	•			
SCYLIORHINIDAE	*Schroederichtys chilensis* (Guichenot, 1848)	•	•		•					
TRIAKIDAE	*Mustelus mento* (Cope, 1877)	•	•							
SQUALIDAE	*Squalus acanthias* (Linnaeus, 1758)				•	•	•			
SQUALIDAE	*Centroscyllium granulatum* (Günther, 1887)				•	•				
SQUALIDAE	*Etmopterus granulosus* (Günther, 1880)								•	•
RAJIDAE	*Bathyraja albomaculata* Norman, 1937				•	•	•			
RAJIDAE	*Bathyraja brachyurops* (Fowler, 1910)						•			
RAJIDAE	*Bathyraja macloviana* (Norman, 1937)						•			
RAJIDAE	*Bathyraja magellanica* (Philippi, 1901)	•	•		•					
RAJIDAE	*Batyraja scaphiops* (Norman, 1937)			•			•			•
RAJIDAE	*Psammobatis rudis* (Günther, 1870)			•			•			
RAJIDAE	*Psammobatis scobina* Philippi, 1857	•	•	•						
RAJIDAE	*Raja chilensis* Guichenot, 1849	•	•		•					
RAJIDAE	*Raja trachyderma* Krefft y Stehmann, 1975				•					
CALLORHYNCHIDAE	*Callorhynchus callorhynchus* (Linnaeus, 1758)	•	•	•	•	•	•			
GALAXIIDAE	*Galaxias maculatus* (Jenyns, 1842)	•	•	•						
APLOCHITONIDAE	*Aplochiton taeniatus* Jenyns, 1812	•	•	•						
APLOCHITONIDAE	*Aplochiton marinus* Eigenmann, 1928	•	•							
GOBIESOCIDAE	*Gobiesox marmoratus* Jenyns, 1842	•	•							
GOBIESOCIDAE	*Syciases sanguineus* Müller and Troschel, 1843	•	•							
SYNGNATHIDAE	*Leptonotus blainvillianus* (Eydoux and Gervais, 1837)	•	•	•						
MERLUCCIDAE	*Merluccius polylepis* Ginsburg, 1954	•	•	•	•	•	•	•	•	•
MERLUCCIDAE	*Merluccius gayi* (Guichenot, 1848)				•					
GADIDAE	*Macruronus magellanicus* (Lönnberg, 1907)	•	•	•	•	•	•			
GADIDAE	*Micromesistius australis* Norman, 1937				•	•	•	•	•	•
GADIDAE	*Salilota australis* (Günther, 1878)		•	•	•	•	•		•	•
MORIDAE	*Austrophysis marginata* (Günther, 1878)				•	•	•	•	•	•
MORIDAE	*Antimora rostrata* (Günther, 1878)				•	•	•	•	•	•
MORIDAE	*Halargyreus johsoni* Günther, 1862							•	•	•
MORIDAE	*Laemonema kongi* Markle and Meléndez, 1988				•			•		
MURAENOLEPIDAE	*Muraenolepis microps* Lönnberg, 1905						•		•	•
MURAENOLEPIDAE	*Muraenolepis orangiensis* Vaillant, 1907						•			•
BYTHITIDAE	*Cataetyx messieri* (Günther, 1878)					•	•		•	•
OPHIDIIDAE	*Genypterus chilensis* (Guichenot, 1848)				•	•	•			
OPHIDIDAE	*Genypterus blacodes* (Schneider, 1801)				•	•	•			
CARAPODIDAE	*Echiodon cryomargarites* Markle *et al*., 1983				•	•	•			
ZOARCIDAE	*Letholychus patagonica* Cunningham, 1871						•			
ZOARCIDAE	*Crossostomus chilensis* (Steindachcner, 1898)			•						
ZOARCIDAE	*Pogonolychyus marinae* (Lloris, 1988)						•			
ZOARCIDAE	*Pogonolychyus elegans* Norman, 1937					•	•			
ZOARCIDAE	*Ilucoetes fimbriatus* Jenyns, 1842	•	•	•						
ZOARCIDAE	*Austrolychus laticinctus* (Berg, 1895)			•						
ZOARCIDAE	*Austrolychus depressiceps* Regan, 1913	•	•	•						
MACROURIDAE	*Coelorhynchus aconcagua* Iwamoto, 1978				•	•				
MACROURIDAE	*Coelorhynchus fasciatus* (Günther, 1878)				•	•	•		•	•
MACROURIDAE	*Coryphaenoides filicaudus* Günther, 1878							•	•	•
MACROURIDAE	*Ventrifossa nigromaculata* (McCulloch, 1907)				•	•	•	•	•	
MACROURIDAE	*Macrurus carinatus* (Günther, 1878)				•	•	•			
ATHERINIDAE	*Austromenidia smitti* (Lahille, 1929)	•	•	•						
AGONIDAE	*Agonopsis chiloensis* Jenyns, 1842	•	•	•						
NORMANICHTHYIDAE	*Normanichthys crockeri* Clark, 1937	•								
COTTUNCULIDAE	*Cottunculus granulosus* Karrer, 1968						•			
SCORPAENIDAE	*Sebastes capensis* (Gmelin, 1788)	•	•		•					
SCORPAENIDAE	*Helicolenus lengerichi* Norman, 1937				•					
CONGIOPODIDAE	*Congiopodus peruvianus* (Cuvier and Valen., 1929)	•	•	•	•	•	•			
PSYCHROLUTIDAE	*Neophrynichthys marmoratus* Gill, 1899	•	•	•	•	•	•			
LIPARIDIDAE	*Careproctus pallidus* (Vaillant, 1888)			•						
LIPARIDIDAE	*Careproctus crassus* de Buen, 1961	•	•	•						
BATRACHOIDIDAE	*Aphos porosus* (Valenciennes, 1837)	•	•	•	•	•	•			
BRANCHIOSTEGIDAE	*Prolatilus jugularis* (Valenciennes, 1833)	•	•		•	•				
CHEILODACTYLIDAE	*Acantholatris gayi* (Kner, 1865)	•	•		•	•				
PINGUIPEDIDAE	*Pinguipes chilensis* (Molina, 1782)	•								
LABRIOSOMIDAE	*Calliclinus gennigutatus* (Valenciennes, 1836)	•								
CLINIDAE	*Myxodes cristatus* Valenciennes, 1836	•								
CLINIDAE	*Myxodes viridis* Valenciennes, 1836	•								
BLENNIIDAE	*Hypsoblennius sordidus* Bennett, 1828	•								
TRIPTERYGIIDAE	*Helcogrammoides cunninghami* (Smitt, 1898)	•								
GOBIIDAE	*Ophiogobius jenynsi* Hoese, 1976	•	•	•	•	•	•			

TABLE 2. (Cont.) – Distribution of species by sectors and bathymetric levels. Used terminology: N northern sector; I: intermediate sector; S: southern sector.

Bathymetric level		0 - 50 m			50 - 500 m			below 500m		
FAMILY	SPECIES	N	I	S	N	I	S	N	I	S
BOVICHTHYIDAE	*Cottoperca gobio* (Günther, 1861)	•	•	•	•	•	•			
BOVICHTHYIDAE	*Bovichthus chilensis* Regan, 1913	•								
NOTOTHENIDAE	*Paranotothenia magallanica* (Forster, 1801)			•			•			
NOTOTHENIDAE	*Patagonotothen squamiceps* (Peters, 1876)			•						
NOTOTHENIDAE	*Patagonotohen brevicauda* (Lönnberg, 1905)	•	•	•						
NOTOTHENIDAE	*Patagonotothen thompsoni* Balushkin, 1993		•	•						
NOTOTHENIDAE	*Patagonotothen cornucola* (Richardson, 1845)	•	•	•						
NOTOTHENIDAE	*Patagonotothen sima* (Richardson, 1845)	•	•	•						
NOTOTHENIDAE	*Patagonotothen wiltoni* (Regan, 1913)	•	•	•						
NOTOTHENIDAE	*Patagonotothen trigramma* (Regan, 1913)			•						
NOTOTHENIDAE	*Patagonotothen ramsayi* (Regan, 1913)			•		•				
NOTOTHENIDAE	*Patagonotothen longipes* (Steindachner, 1876)	•	•	•	•	•	•			
NOTOTHENIDAE	*Patagonotothen tesselata* (Richardson, 1845)	•	•	•						
NOTOTHENIDAE	*Lindbergichthys nudifrons* (Lönnberg, 1905)			•			•			
NOTOTHENIDAE	*Dissostichus eleginoides* Smitt, 1898				•	•	•	•	•	•
NOTOTHENIDAE	*Eleginops maclovinus* (Cuvier, 1830)	•	•	•						
CHAMPSOCEPHALIDAE	*Champsocephalus esox* (Günther, 1861)			•						
HARPAGIFERIDAE	*Harpagifer bispinnis* Schneider, 1801		•	•			•			
SCOPHTHALMIDAE	*Thysanopsetta naresi* Günther, 1880				•	•	•			
BOTHIDAE	*Hippoglossina mystacium* Ginsburg, 1946				•	•				
BOTHIDAE	*Hippoglossina macrops* Steindachner, 1876	•								
BOTHIDAE	*Paralichthys microps* (Günther, 1881)	•								
BOTHIDAE	*Achiropsetta tricholepis* Norman, 1930						•		•	•
BOTHIDAE	*Mancopsetta maculata* (Günther, 1880)					•	•		•	•
BOTHIDAE	*Neoachiropsetta milfordi* (Penrith, 1965)				•	•	•	•	•	•

pedidae, Labrisomidae, Clinidae, Blenniidae and Trypterigidae.

A second group, below 50 m and down to 500 m, is formed by 56 species, 24 (43%) of which are endemic species of the families Ophidiidae, Carapodidae, Cottunculidae and Scopthalmidae.

A third group, from below 500 m of depth, presents 20 species, has no endemic families, and only *Etmopterus granulosus* and *Coryphaenoides filicaudus* are endemic species. This species group segregates as independent group in the cluster analysis, because of its species poverty, and will here be considered as part and marginal condition of the 50-500 m depth fish assemblage (see Table 2).

Latitudinal analysis

The analysis of the latitudinal distribution of the fish groups at the 0-50 and 50-500 m depth level, show four ichthyogeographical sectors: a "northern sector" (42º to 46-47ºS), an "intermediate sector" (47-48º to 51ºS) and a "southern sector" (52º to 56ºS) (Figures 3 and 4). The fauna at 57ºS (Diego Ramírez Islands) appears as an independent group, characterized by its poverty of species (result of scarce sampling), although it seems to be part of the previously defined "southern sector". The fishes below the 500 m depth level show three groups with

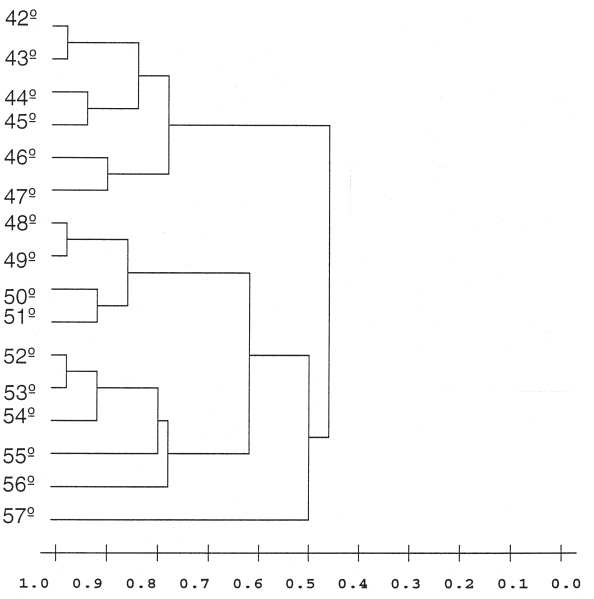

FIG. 3. – Taxocenotic similarity of latitudinal fish associations between 0 and 50 m depth, showing four major fish associations: 1.- 42 to 46ºS (northern sector), 2.- 47 to 51ºS (intermediate sector), 3.- 52 to 56ºS (southern sector), 4.- 57ºS (Diego Ramírez islands).

a "northern sector" of similar range as the groups before(42º to 46ºS), and an "intermediate sector" (47ºto 54ºS) and a "southern sector" that includes the fauna at 57ºS.

The "northern sector" of the 0-50 m depth level is mainly characterized by the presence of the families

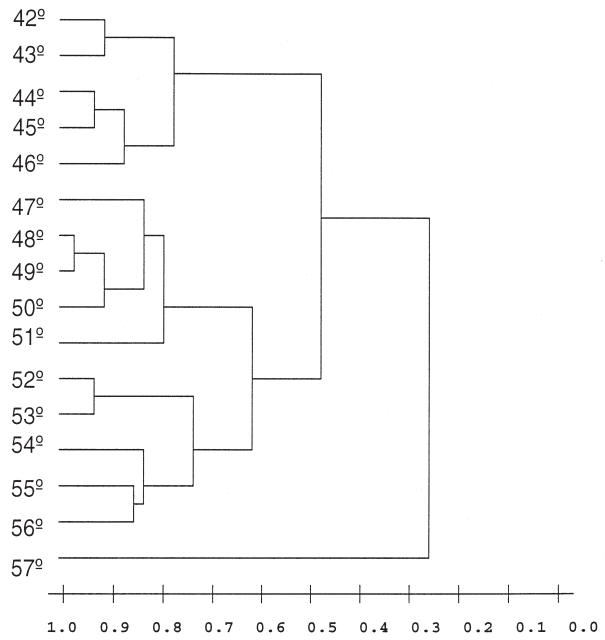

FIG. 4. – Taxocenotic similarity of latitudinal fish associations between 50 and 500 m depth showing four major fish associations: 1.- 42 to 47ºS (northern sector), 2.- 48 to 51ºS (intermediate sector), 3.- 52 to 56ºS (southern sector), 4.- 57ºS (Diego Ramírez islands).

Tripterygiidae, Labrisomidae, Clinidae, Blenniidae, Pinguipedidae, Branchiostegidae, Normanichthyidae and the species *Bovichthus chilensis, Hippoglossina macrops* and *Paralichthys microps*. In the "intermediate sector", different typical families of lower latitudes find their southern distributional limit between 45º and 46ºS (Blenniidae, Clinidae and Normanichthyidae), and between 46º and 50ºS (Cheilodactylidae, Branchiostegidae and Gobiesocidae). Within the same sector the 50º-52ºS latitudes represent the northern distributional limit of the family Harpagiferidae and some species belonging to the "southern sector" such as *Cottoperca gobio* and *Careproctus crassus*. The "southern sector" corresponds to the West-Fuegian Archipelago, and its ichthyofauna is characterized by the great speciation of the families Nototheniidae (mainly belonging to the genus *Patagonotothenia*) and Zoarcidae (genera *Austrolycus, Iluocoetes, Crossostomus, Phucocoetes, Dadyanos* and *Letholycus*) (see Table 2).

The group distributed below 50 m includes several species of wide distribution along the eastern Pacific and western Atlantic Patagonian coast, such

TABLE 3. – Longitudinal distribution of fishes along the Straits of Magellan.

SPECIES	73ºW	72ºW	71ºW	70ºW	69ºW
Patagonotothen thompsoni Balushkin, 1993	•				
Agonopsis chiloensis Jenyns, 1842	•	•	•	•	•	•
Salilota australis (Günther, 1878)	•	•	•	•	•	•
Aplochiton taeniatus Jenyns, 1812	•	•	•	•	•	•
Leptonotus blainvillianus (Eydoux and Gervais, 1837)	•	•	•	•	•	•
Mustelus mento (Cope, 1877)	•	•	•	•	•	•
Galaxias maculatus (Jenyns, 1842)	•	•	•	•	•	•
Eleginops maclovinus (Cuvier, 1830)	•	•	•	•	•	•
Paranotothenia magallanica (Forster, 1801)	•	•	•	•	•	•
Patagonotothen tesselata (Richardson, 1845)	•	•	•	•	•	•
Patagonotothen trigramma (Regan, 1913)	•	•	•	•	•	•
Patagonotothen cornucola (Richardson, 1845)	•	•	•	•	•	•
Patagonotothen longipes (Regan, 1913)	•	•	•	•	•	•
Patagonothen ramsayi (Regan, 1913)	•	•	•	•	•	•
Patagonotothen squamiceps (Peters, 1876)	•	•	•	•	•	•
Schroederichthys bivius (Smith, 1838)	•	•	•	•	•	•
Callorhynchus callorhynchus (Linnaeus, 1758)	•	•	•	•	•	•
Chamsocephalus esox (Günther, 1861)	•	•	•	•	•	•
Harpagifer bispinnis Schneider, 1801	•	•	•	•	•	•
Austrolycus laticinctus (Berg, 1895)	•	•	•	•	•	•
Austrolycus depressiceps Regan, 1913	•	•	•	•	•	•
Austromenidia smitti (Lahille, 1929)	•	•	•	•	•	•
Paralichthys patagonicus Jordan and Goss, 1889			•	•	•
Austromenidia nigricans Richardson, 1848			•	•	•
Phucocoetes latitans (Jenyns, 1842)			•	•	•
Opthalmolycus macrops (Günther, 1880)			•	•	•
Patagonotothen jordani (Thompson, 1916)				•	•
Patagonotothen elegans (Günther, 1880)					•
Patagonotothen canina (Smitt, 1897)					•
Netuma barbus (Lacepede, 1803)					•
Crossostomus chilensis (Steindachner, 1898)					•
Crossostomus fasciatus (Lönnberg, 1905)					•
Dadyanos insignis (Steindachner, 1898)					•
Ilucoetes elongatus (Smitt, 1898)					•
Psammobatis normani McEachran, 1983					•

as *Halaelurus canescens, Callorhynchus callorhynchus, Congiopodus peruvianus, Genypterus chilensis, Genypterus blacodes, Coryphaenoides filicaudus, Macruronus magellanicus, Squalus acanthias, Dissostichus eleginoides* and *Antimora rostrata* . The presence of other species, of more restricted and in some cases very local distribution, segregates three ichthyogeographic sectors (Fig. 4). At its northern sector (from Chacao Channel - Taitao Peninsula; 42º-47ºS), the already indicated species, typical of lower latitudes (among them *Sebastes capensis, Helicolenus lengerichi, Merluccius gayi, Schroederichthys chilensis* and *Bathyraja magellanica*) are found. In the central sector (Taitao Peninsula - Salvation Bay; 47º-52ºS), the previously indicated species are gradually replaced southwards by typical south Patagonian species like *Neophrynichthys marmoratus, Schroederichthys bivius, Thysanopsetta naresi, Neoachiropsetta milfordi, Micromesistius australis, Merluccius australis, Coelorhinchus fasciatus* and *Cottoperca gobio*. The southern sector (Salvation Bay - Cape Horn; 52º-56ºS) is characterized by species endemic of this sector (e.g. *Bathyraja brachyurops, Cottunculus granulosus, Muraenolepis orangiensis* and *Muraenolepis microps, Achiropsetta tricholepis, Paranotothenia magellanica, Patagonotothen ramsayi, Lindbergichthys nudifrons* and *Pogonlycus marinae*) (see Table 2).

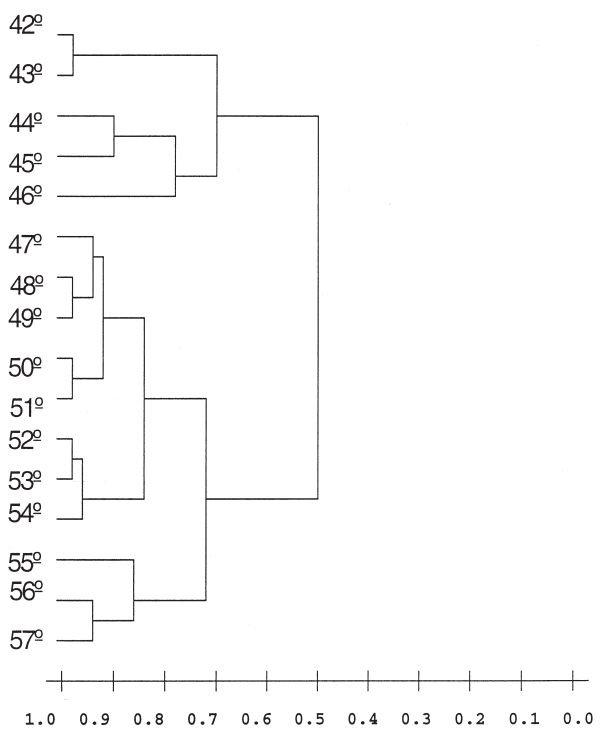

FIG. 5. – Taxocenotic similarity of latitudinal fish associations below 500 m of depth, showing three major fish associations: 1.- 42 to 46ºS (northern sector), 2.- 47 to 54ºS (intermediate sector), 3.- 55 to 57ºS (southern sector).

Straits of Magellan

At least 58 species (see Table 1) are represented on both sides of Patagonia, mainly corresponding to species of the families Squalidae, Rajidae, Gadidae, Moridae, Muraenolepidae, Zoarcidae and Nototheniidae. There are insufficient data to determine how many of these species are really present in the Straits of Magellan, nevertheless the study of the actually known longitudinal distribution (68º-74ºW) of fish species along the Straits of Magellan (Table 1), shows a gradual transition from east to west (Table 3) with a westward decrease in the number of species and in the occurrence of typical Atlantic species (e.g. *Paralichthys patagonicus, Austromenidia nigricans, Phucocoetes latitans, Netuma barbus*) up to approximately 71ºW. (*Notorhynchus cepedianus* and *Symnodon macracanthus* may also correspond to this group).

DISCUSSION

The studied fish fauna corresponds to the" Magellan District" and to the fishes of the "Patagonian Region" as defined respectively by Regan (1913) and Norman (1937), with its northern limit in the region of Chiloé (41º30'S).

The bathymetric distribution analysis of 95 fish species distributed between the latitudes 42º-57ºS shows the existence of a group of coastal or shallow water fishes (0-50 m depth), clearly different (low similarity) to a group of deep water fishes or "fishes of the shelf" (below 50 m depth), fully corresponding with the "Subantarctic Region" and "Deep Waters" established by Nakamura *et al*. (1986) for the south of South America. Both species associations showed similar north-south distribution trends, with a well defined "northern sector" characterized by the dominance of low latitude elements (of the "Valdivian District", sensu Balech, 1954), a "southern sector" with endemic elements, and an intermediate "transition sector", that must be considered as an independent unit, according to its extension and ichthyological composition. This "transition zone" extends from the sector of the Taitao peninsula to the Magellan Straits. These before recognized sectors, agree, respectively, with the divisions proposed

by Hart (1946) and named "North Region", "Intermediate Region" and "South Region", and the divisions of Laevastu (1961), named "Peruvian-Chilean Region", "Area of Transition" and "Patagonic Region".

As has been indicated by López (1963) and Lloris and Rucabado (1991), the latitudinal zonation of the "coastal fishes" and the "fishes of the shelf" seems to bear relation with the "West Wind Current" and its division in front of the Chilean coast at 41ºS, in a northward going branch, or "Peru Current" and a southward flowing branch, or "Cape Horn Current" (Sverdrup *et al*., 1942). This oceanographic situation apparently acts as a northern dispersion barrier, along the Pacific Patagonian coast, for more southerly faunistic elements, and may explain the separation of the "Valdivian District" and the "Chiloé District" (*sensu* Balech, 1954).

In the particular case of the "coastal fishes" of this study, the "northern sector" and "intermediate sector" correspond very well with the before indicated "Chiloé District" of Balech (1954), despite some differences in their latitudinal extensions. Future analyses of this geographic area will probably produce important information, such as the existence of a low salinity sector of channels and sounds of estuarine character (Pickard, 1971) and an oceanic coastal sector, with similar characteristics of salinity and wave exposure, corresponding to the shores of lower latitudes in Chile. This would eventually explain the latitudinal overlap of the north distribution range of the fishes of the previous sectors and the south range of the fishes of the Valdivian District. The latter seem to be mainly distributed along the oceanic coastline. Only a situation of this type can explain the presence in the far south of the Magellan Region of *Syciases sanguineus* Müller and Troschel, 1843 (see Sielfeld, 1979 a) and *Gobiesox marmoratus* Jenyns, 1842 (pers. obs.). The previous distribution pattern also gives sense to the records of *Aphos porosus* (Valenciennes, 1837) and *Paralabrax humeralis* (Valenciennes, 1828) by Lönnberg (1907) and *Pinguipes chilensis* (Molina, 1782) by Lorentzen *et al*. (1979) for the Magellan Region.

Nevertheless, a more detailed and complete knowledge of the ichthyogeography of the Patagonian Archipelago needs to take into account other aspects, especially those related with its particular environment. The following have been identified to be of particular importance:

1. - The geological conformation of the coastline and the relationship between beach types (granulometry and inclination), the sea floor and the fish community: It must be noted that beaches of the Atlantic sector are of little inclination and largely formed by morrenic and aluvial materials, while those of the Pacific sector principally correspond to diorites, basalts and metamorphic rocks, determining rocky coasts of strong inclination. This geological structure is arranged parallel to the Pacific margin and the transition between the two types of shore occurs at the level of the central portion of the Straits of Magellan (Instituto Geológico de Chile, 1968).

2. - The extension of the continental shelf and its importance in the distribution and abundance of demersal fishes: The Chilean shelf broadens progressively southwards, attaining its maximum extension (50 nautical miles) to the southwest of the Cape Horn Archipelago (Ojeda, 1983), where the marine bottom is mainly constituted of sand, mussel and coral sands and Foraminifera (Nakamura *et al*., 1986).

3. - The effect of rainfall on the intertidal pools: A strong north-south and east-west increase of the precipitation is typical of Patagonia (Jeréz and Arancibia, 1972; Zamora and Santana, 1979), with annual variations ranging from 200 mm (eastern sector of the Straits of Magellan) to 8.500 mm on the west coast (Guarello Island). The effect on the intertidal pool communities has not been evaluated yet.

4. - The currents in the channels, produced by tidal changes, and their effect on the coastal fauna of the interior channels and their distribution is important.

5. - The Patagonic zone presents four main sea surface currents: The Cape Horn Current, Peru or Humboldt Current, Falkland Islands Current and Brazil Current (Nakamura *et al*., 1986); only the first two directly affect western Patagonia. The effect of these currents on the distribution of the fish has been analyzed by López (1963), although further studies and research, on a more local scale, are necessary.

6. - The coast of the west Pacific margin of the Patagonian Archipelago is exposed to the oceanic waves and shows an intertidal kelp belt of *Durvillea antartica* (Chamisso) Harriot, 1892 and *Lessonia nigrescens* Bory, 1826 (see: Alveal, 1970; Romo and Alveal, 1977; Santelices, 1980; Santelices *et al*., 1977). This belt is associated with many species (*e.g*..*Concholepas concholepas* (Brugiere,1789), *Taliepus dentatus* (Milne-Edwards, 1834), *Scurria scurra* (Lesson, 1830), *Chiton granosus* Frembly, 1827, *Sicyases sanguineus Müller and Troschel,*

1843) which are typical of these ecological situations and that do not inhabit protected channels and sounds of the inner archipelago, determined by vast mantles of *Macrocystis pyrifera* (Linnaeus) C. Agardh, 1820, with a subtidal mantle of *Lessonia vadosa* Searles, 1973 (see Santelices and Ojeda, 1984). The distribution of these kelp belts must be taken into account in further fish studies.

6. - In addition to the previous aspects, attention should also be given to complementary details such as the effect of the degree of tide-height on litoral and intertidal fish communities, the vast continental glaciers, the snowdrifts and their effect on salinity, the composition of the bottom ichthyofauna of the deep channel sectors and sounds, and the effect of the oceanic waves on the litoral communities.

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